Attachment E

The highlighted and underlined portions of this document set forth the requirements of the DMSA Characterization/Remediation Plan that are subject to requirements of this Agreed Order. Those portions of this document not highlighted and underlined are not subject to, or enforceable under, the provision of the Agreed Order and are provided for information purposes only.

Paducah Gaseous Diffusion Plant
Department of Energy Material Storage Area
Characterization/Remediation Plan
Paducah, Kentucky

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Paducah Gaseous Diffusion Plant
Department of Energy Material Storage Area
Characterization/Remediation Plan
Paducah, Kentucky

Date Issued – September 2003

Prepared for the
U.S. Department of Energy
Office of Environmental Management

BECHTEL JACOBS COMPANY LLC
managing the
Environmental Management Activities at the
East Tennessee Technology Park
Oak Ridge Y-12 Plant Oak Ridge National Laboratory
Paducah Gaseous Diffusion Plant Portsmouth Gaseous Diffusion Plant

under contract DE-AC05-98OR22700
for the
U.S. DEPARTMENT OF ENERGY

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ACRONYMS

AHA	Activity Hazard Analysis
AOC	Area of Concern
BA	budget authority
BJC	Bechtel Jacobs Company LLC
DMSA	DOE Material Storage Area
DOE	United States Department of Energy
DQO	Data Quality Objectives
ES&H	Environmental, Safety, and Health
ISMS	Integrated Safety Management System
KDEP	Kentucky Department for Environmental Protection
LLW	Low-Level Radioactive Waste
M&I	Management and Integration
NCS	Nuclear Criticality Safety
NCSA	Nuclear Criticality Safety Approval
NCSE	Nuclear Criticality Safety Evaluation
NDA	Non Destructive Analysis
NEPA	National Environmental Policy Act
NFT	Nuclear Filter Technology Corporation
NOV	Notice of Violation
NRC	Nuclear Regulatory Commission
PCBs	Polychlorinated Biphenyls
PGDP	Paducah Gaseous Diffusion Plant
PORTS	Portsmith Gaseous Diffusion Plant
QA	Quality Assurance
QAP	Quality Assurance Plan
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technicians
RFD	Request for Disposal
SA	Safety Advocate
SAP	Sampling and Analysis Plan
SEC	Safety and Ecology Corporation
SME	Subject Matter Experts
SMO	Sample Management Office
STR	Subcontract Technical Representative
SWMU	Solid Waste Management Unit
TBD	to be determined
TSCA	Toxic Substances Control Act
USEC	United States Enrichment Corporation
WBS	Work Breakdown Structure
WGP	Waste Generation Plan
WSMS	Westinghouse Safety Management Solutions LLC
WSS	Work Smart Standards

EXECUTIVE SUMMARY

On September 5, 2000, the Kentucky Department for Environmental Protection issued a Notice of Violation (NOV) to the United States Department of Energy (DOE) alleging that:

1. DOE generated solid waste, failed to characterize that waste and subsequently managed the wastes in Department of Energy Storage Areas (DMSAs);
2. DOE failed to notify the State regarding these Solid Waste Management Units (SWMUs) and;
3. DOE stored hazardous and mixed waste for greater than 90 days without a permit.

The NOV included required remedial measures. Item 4 of the required actions included the submittal of a workplan within 90 days of receipt of the NOV. The workplan is to address the characterization of all wastes managed in DOE Material Storage Areas (DMSAs), Solid Waste Management Units (SWMUs), and Areas of Concern (AOCs). The workplan is to contain schedules for the characterization, proper storage, and final disposition of solid and hazardous wastes managed in DMSAs, SWMUs, and AOCs. All solid and hazardous wastes within DMSAs are to be properly characterized and managed in accordance with the approved workplan no later than June 1, 2001.

This document responds to Item 4 of the above-mentioned NOV. It outlines activities for the characterization of wastes managed in 160 DMSAs. These activities will address Nuclear Criticality Safety (NCS) concerns, and will also include waste determination and/or characterization activities for radioactive waste, solid waste, Resource Conservation and Recovery Act (RCRA) hazardous waste, and asbestos and polychlorinated biphenyls (PCBs) regulated under the Toxic Substances Control Act (TSCA). For purposes of this document, RCRA hazardous wastes are wastes regulated as hazardous under Kentucky Hazardous Waste Regulations. In addition, any required packaging of RCRA hazardous or TSCA generated waste is included. The workplan scope also includes the proper management, treatment, and disposal of all hazardous wastes characterized within the DMSAs. Any resulting non-hazardous solid waste will be disposed on-site at the Paducah Gaseous Diffusion Plant (PGDP) C-746-U Landfill, assuming it meets the waste acceptance criteria. Finally, the scope includes the required permitting and closure activities for those DMSAs that are determined to contain hazardous waste.

The method of accomplishment for the work utilizes the management and integration of a number of subcontractors to build a DMSA Project Team. Prioritization of the DMSAs is used to sequence and schedule the characterization activities by four Field Execution Teams. Field resources include over 60 personnel.

Characterization of all material in 160 DMSAs would be completed approximately 50 months from notice to proceed by DOE. The notice to proceed was assumed to be January 1, 2001. Treatment or disposal of hazardous waste, with available technology, is scheduled to be completed within 12 months of characterization. The workplan calls for a 60-month project schedule to complete characterization, treatment, and disposal activities.

The total budget authority (BA) for this project is estimated to be $82,000,000.

The BA estimated by year is:

FY 2001	$14,000,000
FY 2002	$18,000,000
FY 2003	$18,000,000
FY 2004	$18,000,000
FY 2005	$14,000,000

I. INTRODUCTION

On October 24, 1992, President Bush signed the Energy Policy Act of 1992, Pub. Law 102-486, which established the United States Enrichment Corporation (USEC) as a government corporation. USEC's charter was to provide uranium enrichment services to the government and to private industry on a profitable and competitive basis. To accomplish this purpose, USEC entered into an agreement on July 1, 1993, with the DOE, to lease the operations facilities at the gaseous diffusion plants, located at Paducah, Kentucky (PGDP) and Portsmouth, Ohio (PORTS) from DOE. Through this arrangement, the uranium enrichment activities previously performed by DOE would be taken over by this newly created government corporation. USEC would then perform this scope of work, with the eventual objective of becoming a publicly owned private corporation. As part of this process, DOE would gradually withdraw its role as a regulator for enrichment operations, and the Nuclear Regulatory Commission (NRC) would assume the role of regulator for USEC's operations. The transition to NRC regulation occurred on January 1, 1997.

Prior to the transition to NRC regulation, a number of areas in which various materials were stored within USEC leased space were identified. These materials presented regulatory issues that could prevent the NRC from certifying USEC's continued operation of the gaseous diffusion plants. The lack of characterization data regarding Nuclear Criticality Safety (NCS) concerns was the main issue with respect to these materials. DOE agreed, on May 28, 1996, to accept back the leasehold for these areas, which would return the responsibility and authority for management of materials within these areas to DOE. These "deleased" areas became DOE Material Storage Areas (DMSAs) when the lease was modified on December 31, 1996. The DMSAs contained surplus equipment, parts, materials and low-level radioactive and PCB wastes. The NRC subsequently assumed regulatory authority over the USEC operations at the gaseous diffusion plants. This workplan presents DMSA information limited to the DMSAs located at PGDP.

At the time DOE accepted return of the DMSAs, no accurate inventory of the materials within the DMSAs existed, except the containerized waste stored in the Waste Management Storage Areas. As part of the agreement with USEC to accept the DMSAs, DOE required USEC to produce an inventory of the materials located in the DMSAs. This inventory provided the most complete information regarding the contents of the DMSAs available at that time. In many cases, however, materials were not arranged in a manner that allowed access to all materials within the DMSA. The inventory and identification of all materials in the DMSAs has not been confirmed or completed.

Limited activities in the DMSAs have been conducted since January 1997 to support NCS characterization. Preliminary efforts have categorized the DMSAs as Phase 1 (expected to have no fissionable material, but not fully characterized), Phase 2 (items possibly containing fissionable material), and Phase 3 (items characterized for storage and containing no fissionable materials). Eleven DMSAs were identified as high priority regarding NCS classification. These DMSAs were NCS characterized by USEC during Fiscal Year 2000. As part of this project, potential RCRA hazardous and TSCA concerns were identified.

The NCS characterization effort for a Phase 1 is assumed to be minimal compared to a Phase 2 DMSA. The NCS characterization of a Phase 1 DMSA will still require a review and evaluation of existing data and process knowledge for inventory of items in order to properly prepare the characterization reports. Currently Phase 1 DMSAs contain univentoried, uncharacterized material, therefore, it is anticipated that an additional 10% of NCS sampling will be required in Phase 1 DMSAs compared to the amount of actual field sampling that will be required in the Phase 2 DMSAs. No additional NCS sampling is anticipated for Phase 3 DMSAs. The time required for a Phase 2 DMSA is

significantly greater due to the restrictions of movement of fissile material under NCS requirements. Items uncharacterized for NCS cannot be moved until they are exempted by a DMSA Inspector or sampled and analyzed for the amount of fissionable material.

Phase 3 DMSAs contain items which have been reviewed and determinations have been made for NCS, RCRA, TSCA, etc. The following definitions for a Phase 1, 2, and 3 DMSA are taken from Bechtel Jacobs Company LLC (BJC) procedure PA-3002, "Administration of Paducah DOE Material Storage Areas."

- Phase 1 DMSA – Materials have not been *fully characterized.* However, the DMSA has been walked down by NCS personnel and no fissionable or potentially fissionable materials have been identified.

- Phase 2 DMSA – Materials may or may not be *fully characterized.* However, DMSA is considered to contain fissionable or potentially fissionable material based on walkdown by the NCS specialist or based on NCS characterization.

- Phase 3 DMSA – All materials have been *fully characterized* and no fissionable materials are included.

On September 5, 2000, the Commonwealth of Kentucky, Department for Environmental Protection issued a Notice of Violation (NOV) to DOE for failure to comply with regulatory requirements regarding solid and hazardous waste and for failure to comply with conditions of the PGDP Hazardous Waste Permit. A required remedial measure was identified in the NOV as the submittal of a workplan to fully address the characterization of all wastes managed in DMSAs. The purpose of this plan is to satisfy this required action and includes the scope of work, method of accomplishment, schedule, assumptions, and cost estimate, for characterization of DMSAs and disposition of any resulting solid and RCRA hazardous wastes.

II. SCOPE OF WORK

The scope of this project includes characterization of 160 Department of Energy Material Storage Areas (DMSAs) for NCS, Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA), radioactive, and solid waste concerns. TSCA waste generated will be packaged and stored. Final disposition will be managed in a separate program according to TSCA requirements. RCRA hazardous and solid waste will be packaged, stored, treated and disposed, as required. Material in fixed equipment located within DMSA boundaries will be characterized and the waste generated managed in accordance with regulatory requirements. This workplan assumes that up to 16 fixed equipment systems will be encountered during characterization; however, the scope excludes removal of fixed equipment and standing buildings.

A Part A RCRA hazardous permit application will be submitted for those areas where RCRA hazardous wastes are discovered. Closure of the areas identified in the RCRA hazardous permit will be accomplished in accordance with RCRA hazardous requirements. Although not included in this scope for planning purposes, it is recommended that negotiation of an agreed order be pursued as an alternative to the permitting/closure of DMSAs found to contain hazardous wastes.

Major elements of the work scope include mobilization, characterization, waste management, RCRA hazardous treatment, RCRA hazardous disposal and demobilization. Mobilization will include hiring staff and subcontractors, installation of staff support facilities, and training. Treatment of RCRA hazardous wastes will be completed if the treatment technology is available.

Although not included in this scope for planning purposes, it is recommended that the non-hazardous scrap metal characterized in the DMSA Project be fed into the "Scrap Metal Removal Project" for disposition, either through inclusion under the existing Engineering Evaluation/Cost Analysis or as a separate waste stream.

The preferred alternative action will be determined based upon characterization results and alternatives identified in the "Engineering Evaluation/Cost Analysis for Scrap Metal Disposition at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky." An accurate volume of non-hazardous scrap metal located in DMSAs has not been estimated at this time. A rough order of magnitude estimate is considered to be 140,000 cubic feet of scrap metal with a high uncertainty due to plastic wrapped unknown items.

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III. WORK BREAKDOWN STRUCTURE AND SCHEDULE

In order to establish a schedule for the workplan, which addresses the environmental concerns as indicated in the NOV, the DMSAs were divided into priority levels, with A being the highest priority.

Level A priority includes those DMSAs that present potential for release of hazardous materials to the environment, or that have been currently identified as having a higher potential for containing RCRA hazardous or TSCA waste. A total of 33 DMSAs have been assigned level A priority including the C-400-01, C-400-03, C-400-05 (C-400 Test Loop), C-409-01, and C-409-02 DMSAs, outside DMSAs, and the 11 DMSAs that have been NCS characterized by United States Enrichment Corporation (USEC) and have identified potential RCRA hazardous or TSCA concerns. Level B priority is assumed to be those DMSAs that have a substantial number of uncharacterized containers that potentially contain RCRA hazardous or TSCA wastes. There are currently 11 level B priority DMSAs. All 116 remaining DMSAs will be worked as a level C priority. Characterization will begin with the level A priority actions. Level B and C priority areas will be worked as additional resources are mobilized. Table 1 identifies the priority listing of the DMSAs. Figures 1-11 present maps of the DMSA locations. Appendix A depicts the overall schedule.

Subject Matter Experts (SMEs) will inspect all outside areas and identify potential RCRA hazardous or TSCA concerns that will be managed by priority. Characterization of materials will begin with NCS evaluations as needed, followed by characterization for radiological, asbestos, RCRA hazardous and TSCA (PCBs). Wastes identified as RCRA hazardous or TSCA will be managed appropriately, including packaging, marking, storage, etc.

RCRA hazardous wastes requiring treatment will be treated in accordance with the regulations. Transportation of the RCRA hazardous and solid wastes to approved treatment/disposal sites will begin within 12 months of the waste characterization, and will continue until the wastes are dispositioned. Wastes meeting the respective acceptance criteria may be disposed at government, commercial, and on-site facilities. RCRA hazardous and solid wastes not meeting the disposal facility acceptance criteria will be stored.

Mobilization began in January 2001 and will continue through June 2001. Field crews began activities during February 2001 and will continue through March 2005. Waste treatment and disposal will be completed by the end of December 2005 in accordance with regulatory requirements. Table 1 provides a full listing of DMSAs by priority assignment.

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DMSA PRIORITY LISTING
Table 1

PRIORITY	DMSA #	PHASE	DESCRIPTION OF MATERIALS
A	**C-400-05**	2	Unknown, Process Material, Containers
	C-400-01	2	TCA Degreaser, Uranium Recovery Unit
	C-400-03	2	Gold Dissolver Tank
	C-409-01	2	Slope Test Facility, Unknown Contents
	C-409-02	2	Stabilizing Booths, Unknown Contents
	OS-14	2	Rail Car Tankers
	OS-06	2	Lay Down Yard, Drums
	OS-07	2	Lay Down Yard, Drums and plastic wrapped equipment
	OS-15	½	Process Equipment – Suspect Tanks
	NCS High Priority Top 11		Misc. Equipment (NCS Characterized)
	C-331-09	2	
	C-331-10	3	
	C-331-13	2	
	C-331-14	2	
	C-331-15	2	
	C-333-31	2	
	C-335-04	3	
	C-335-05	2	
	C-337-30	2	
	C-337-36	2	
	C-337-37	3	
	Outside Misc. Phase 1 (OS-02, OS-03, OS-04, OS-05, OS-08, OS-09, OS-10, OS-11, OS-12, OS-13	All Phase 1	Misc. Equipment
	Outside Misc. Phase 2 (OS-16, OS-17, OS-18)	All Phase 2	Misc. Equipment
B	**C-400-06**	2	Cadmium Plating Tanks
	C-331-16	2	B-25 Boxes, Misc. Process Equipment
	C-337-42	2	Drummed Material
	C-337-43	2	Drummed Material
	C-337-44	2	Drummed Material
	C-337-45	2	Drummed Material
	C-333-41	2	Drummed Material
	C-333-42	2	Drummed Material
	C-333-43	2	Drummed Material
	C-335-03	1 (Drums)	Drummed Material
	C-720-01	2	Varnish Tank

PRIORITY	DMSA #	PHASE	DESCRIPTION OF MATERIALS
C	**C-310 Phase 2 (5)** C-310-01, C-310-02, C-310-03, C-310-04, C-310-05	All Phase 2	Misc. Process Equipment
	C-333 Phase 2 (13) C-333-01, C-333-03, C-333-04, C-333-05, C-333-20, C-333-21, C-333-22, C-333-23, C-333-32, C-333-37, C-333-38, C-333-39, C-333-40	All Phase 2	Misc. Process Equipment, LLW
	C-333 Phase 1 (26) C-333-02, C-333-06, C-333-07, C-333-08, C-333-09, C-333-10, C-333-11, C-333-12, C-333-13, C-333-14, C-333-15, C-333-16, C-333-17, C-333-18, C-333-19, C-333-24, C-333-25, C-333-26, C-333-27, C-333-28, C-333-29, C-333-30, C-333-33, C-333-34, C-333-35, C-333-36	All Phase 1	Misc. Process Equipment, LLW, UF_4
	C-337 Phase 2 (7) C-337-23, C-337-25, C-337-27, C-337-29, C-337-35, C-337-40, C-337-41	All Phase 2	Misc. Process Equipment
	C-337 Phase 1 (31) C-337-01, C-337-02, C-337-03, C-337-04, C-337-05, C-337-06, C-337-07, C-337-08, C-337-09, C-337-10, C-337-11, C-337-12, C-337-13, C-337-14, C-337-15, C-337-16, C-337-17, C-337-18, C-337-19, C-337-20, C-337-21, C-337-22, C-337-24, C-337-26, C-337-28, C-337-31, C-337-32, C-337-33, C-337-34, C-337-38, C-337-39, C-337-40	All Phase 1	PCB Waste, UF_4
	C-335 Phase 3 (4) C-335-09, C-335-10, C-335-11, C-335-12	All Phase 3	UF_4, Misc. Process Equipment

PRIORITY	DMSA #	PHASE	DESCRIPTION OF MATERIALS
C (continued)	**C-335 Phase 2 (4)** C-335-02, C-335-03, C-335-06, C-335-07	All Phase 2	Misc. Process Equipment
	C-335 Phase 1 (2) C-335-01, C-335-08	All Phase 1	Misc. Process Equipment
	C-331 Phase 3 (6) C-331-19, C-331-20, C-331-21, C-331-22, C-331-23, C-331-24	All Phase 3	UF_4, Misc. Process Equipment
	C-331 Phase 2 (7) C-331-01, C-331-03, C-331-05, C-331-06, C-331-07, C-331-08, C-331-12	All Phase 2	Misc. Process Equipment
	C-331 Phase 1 (5) C-331-02, C-331-04, C-331-11, C-331-17, C-331-18	All Phase 1	UF_4, Misc. Process Equipment
	C-400 Phase 2 (3) C-400-02, C-400-07, C-400-08	All Phase 2	Closed RCRA hazardous unit, Misc. Equipment
	C-720 Phase 2 (3) C-720-02, C-720-03, C-720-04	All Phase 2	Misc. Equipment